SUBJECT INDEX

Accelerated crucible rotation technique 265
Acceptor impurities 53
Alloy fluctuations 56
Anodic oxidation 173
Arsine, monolayer growth with 139
Atomic adlayer 153
Atomic layer epitaxy (ALE) 137
  growth model 145
  growth rates and temperature 139
  kinetics 137
Auger depth profile 171
Auger-spectra 167, 179

Background shallow impurities 53
Bridgman growth 259, 296
Bromine/methanol etching 78

Cadmium mercury telluride 154
Capacitance profiling 52, 59
Cartesian co-ordinates 125
Carrier lifetimes in LPE 314
Catastrophic dissolution 185
Centre nucleation 181
Charge leakage 57
Chemical beam epitaxy (CBE) 83, 110
Chemical boundary layer theory 126
Chemical vapour deposition 125
Chemisorption 146
Compressing stress 183
Crucible rotation, crystal growth 265
Crystal block structures 234
Crystal development 191
Crystal face characterization 194
Crystal growth 191
  crucible rotation 265
  edge of dislocations 199
  hillocks 215
  impurities 207
  mechanism 197
  quenching 263
Crystal impurities 237
Crystal inclusions 234
Crystal interlacing 220
Crystal macrolayers 229
Crystal macrosteps 226
Crystal slip patterns 220
Crystal spiral growth 197, 207
Crystal striations 232
Crystal surface entropy 203
Crystal surface nucleation 196

Deposition kinetics 153
Diethyl zinc 150
Diffractometer
  double crystal 250
  four crystal monochromator 251
  triple axis 251
Diffusive dividing layer 161, 185
Dimethyl gallium 142
Diode, light emitting 30
Dopants
  electrical activity 298, 311
  extrinsic 295
  indiffusion 149
  segregation 301, 314
Doping 48
Doping gradients 154
Double crystal diffractometer 250

Ekman flow 266
Electroluminescence 102
Electron satellites 54
Epitaxial dividing layer 159, 166
Epitaxial growth 108
Epitaxial layers
  lattice-matched 8
  mis-matched 12
Epitaxial photodeposition 153
Epitaxy
  atomic layer 137
  chemical beam 83, 110
  liquid phase 159, 307
  metal organic chemical vapour phase 83, 145
  metal organic vapour phase 83, 112, 153, 316
  molecular beam 153, 324
  organo metallic vapour phase 115
  selective area 6, 7
Etching, bromine/methanol 78
Excimer laser 154

First order adsorption model 145
Flow fluxes 127
Four crystal monochromator diffractometer 251
Free-radical polymerisation 150

Gallium arsenide
  AlGaAs system 58
  grown on Si substrate 23
  OEIC 5, 8, 13, 18
Gallium indium phosphate sandwich 100
Gas composition switching 41
Gas curtain concept 41
Gas phase decomposition 139
Gas-phase photo-excitation 150
Gas-phase photolysis 150
Gas-phase reactions 142
Graded step process 8

GRIN SCH strained single quantum well laser 13, 14
Growth coalescence 181
Growth hillocks 215
Growth techniques 83
Growth temperature 41

Heterojunction bipolar transistor 11
Heterojunction insulated gate FET 10
High electron mobility transistor 11
Horizontal integration
  OEICs 6
  PICs 16

Impurities 53, 207, 237
Indium gallium arsenide/gallium arsenide quantum wells 57
Indium phosphide
  gallium heterostructures on Si substrate 28, 32
  grown on Si substrate 26
  OEIC 5, 9, 14, 18
Integration technology 6
Interdiffused multilayer system 63
Interface relaxation 160
  kinetics 181
Intra-molecular bond breaking reactions 153
Ion implantation 298
Ionization energies in LPE 314
Ion-milling 78

Junction FET 10

Kinematic waves 202

Laser assisted atomic layer epitaxy 141
Laser diodes 103
Lasers
  GaInAsP–InP on silicon substrate 32
  InP based buried heterostructure 9
  waveguide integration 16
Lattice-matched epitaxial layers 8
Lattice mismatch 45
Liquid phase epitaxy (LPE) 159, 307
  carrier lifetimes 314
Low temperature growth of GaAs 128

Magnetic field, photoluminescence 54
Magneto luminescence 52
Magneto photoconductivity 52
MESFET 15
Metal–insulator–semiconductor FET 10
Metal organic chemical vapour epitaxy (MOCVE) 83, 145
Metal organic molecular beam epitaxy (MOMBE) 83, 110
Metal organic vapour phase epitaxy (MOVPE) 83, 112, 153, 316
  carbon incorporation 92
  GaAs, selective growth 89
  gas inlet systems 85
  growth kinetics 87
  growth rate and temperature 90
  growth technology 51
  new device concepts 107
  pumping systems 85
  reactors 83
  role of AsH_3 87
  using X-ray diffraction 249
Microcracking 153
Micromorphology 189
Molecular beam epitaxy (MBE) 153, 324
Monolayer growth
  with arsine 139
  with trimethyl gallium 138
Monomethyl gallium 144

Ohmic contacts 77
Optical fibre communication 63
Optical links, applications for 1
Optical transmitter/receiver 2, 3
Optoelectric devices 41
Optoelectronic integrated circuits 4
  lattice-matched epitaxial layers 12
  mis-matched epitaxial layers 12
  substrates 5, 18
Optoelectronic materials 1–19
Optoelectronics 111
Organometallic precursors 149
Organometallic vapour phase epitaxy (OMVPE) 39, 115

Partial substrate dissolution 161
Photoassisted etching 150
Photoconductive devices 280
Photoelectrochemical etching 149
Photoelectron emission threshold 152
Photo-induced organometallic processes 149
Photoluminescence 55, 70, 98
  in magnetic fields 54
  of quantum well 44
Photoluminescence excitation spectroscopy 57, 98
Photonic integrated circuits 4, 15
Photovoltaic devices 283
PIN-FET OEICs 11, 15
PIN photodetector 9
Pyrolysis
  carrier gas kinetics 115
  of TMGa and AsH_3 119
  of TMGa and TBAs 120

Quantum wells 55, 138
  InGaAs/GaAs 57
  lasers 107
  photoluminescence 44

Relaxation kinetics 166
Rocking curve 252

Saturated monolayer growth 138
Selective area epitaxy 6, 7
Silane, n-type doping of GaAs 130
Silica mono-mode optical fibre 4
Silicon
  III–V alloys 21–36, 39, 53, 93, 97, 108, 137, 150
  growth at very low total pressure 132
  OEICs 5, 12, 18
Silicon nitride masking film 75
Sintering 193
Slip planes 256
Solid phase dissolution 163
Spiral shearing 265
SPRITE principle 262
Steric hindrance 141
Stokes shift 56
Strained-layer superlattices 154
Stress-induced supercooling 163
Surface adsorbate 144
Surface migration 153
Surface migrating kinetics 154

Tension stress 183
Tertbutylarsine 115
Threading dislocation 21, 22
Three-dimensional integration 111
Transient Couette flow 265
Transmission electron microscopy 98
Tri-isobutylaluminium 152
Trimethyl gallium 115, 154
Trimethyl gold 152
Triple axis diffractometer 251

Undoped material, electrical behaviour 296

Vertical integration
  OEICs 6
  PICs 16

Wafer scale uniformity 111
Wavelength division multiplexing 2

X-ray diffraction, MOVPE 249

COMPOUND INDEX

AlAs 138, 184
AlGaAs 12, 138
AlGaInP 97
AsH_3 87, 115, 154

CdAs 222
CdHgTe 152, 259, 295
CdTe 63
$(CH_3)_3Ga$ 154
$(C_2H_5)_2Zn$ 150

$Fe(CO)_5$ 152

GaAlAs 109
GaAlAsP 160
GaAs 5, 8, 13, 18, 21, 23, 45, 57, 70, 79, 115, 138
GaAsP 12
GaAsSb 160
GaInAs 93, 97
GaInAsP 29, 93
GaInP 98

HgTe 63

InAs 138, 140
InAsSb 166
InGaAs 13, 15, 45, 57, 73
InGaAsP 15, 42
InGaSb 166
InP 5, 9, 18, 21, 26, 45, 73, 93, 138, 150

Si 5, 12, 18, 21
SiH_4 130
Si_3N_4 75

TBAs 115
TIBA 152
TMGa 115

ZnS 94
ZnSe 94